THE

BOSTON MECHANIC,

AND

Journal of the Useful Arts and Sciences.

[In proportion as the Arts and Sciences are cultivated, is Civilization advanced.]

EDITED BY SEVERAL PRACTICAL MEN.

VOLUME IV.

BOSTON:
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1835.

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ADVERTISEMENT.

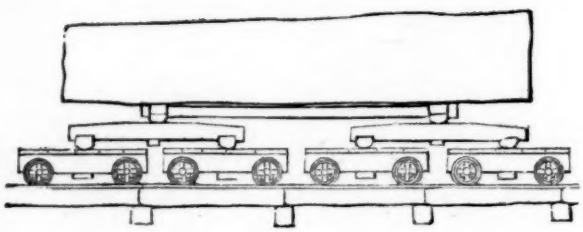
NOTWITHSTANDING many discouragements, through the exertions and sacrifices of a number of individuals who constituted the MECHANIC FUND ASSOCIATION, and assistance afforded by other gentlemen of this city, this work was sustained three years. At the end of that time it was decided, that if the Magazine would not in future support itself, it would be best to discontinue it. During the past year it has not done this, although the list of subscribers has gradually increased. What is now its destiny is not yet decided. The probability is, that it will be united with another scientific work, published in this city, the value of which is extensively acknowledged. Whatever shall be the result, we have the satisfaction of a well founded belief, that not a little good has been done by the publication of the MECHANIC, and that it will still continue to do good wherever its bound volumes shall be read.

Gift. 6/12/15

MACHINERY

FOR TRANSPORTING THE PILLARS OF THE NEW COURT HOUSE IN BOSTON.

Fig1.



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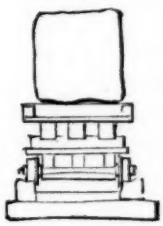

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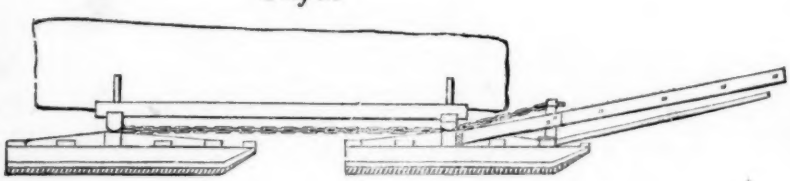

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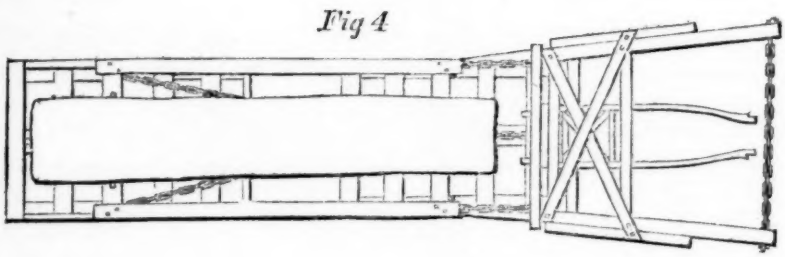

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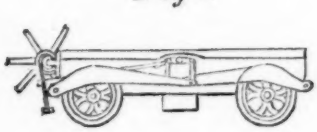
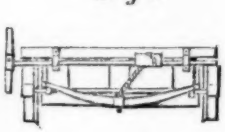


Fig 6.



BOSTON MECHANIC,

AND

Journal of the Useful Arts and Sciences.

MARCH, 1835.

TRANSPORTATION OF THE COLUMNS FOR THE NEW COURT HOUSE.

[Furnished for the Boston Mechanic.]

The former Court House in Boston, not being sufficiently commodious for every purpose, and being considered unsafe, on account of having been so badly built as to have been condemned, it was undertaken to erect a new building in its stead. The elegant granite edifice designed for this purpose is now completed on the outside, except the porticos, one at each end, each of which will consist of four pillars of granite, the transportation of which from the quarries forms the subject of this article. We hope, by and by, to be able to present our readers with a view of the completed edifice, which will be one of the most elegant buildings we have.

The columns designed for the New Court House will be eight in number. They are 25 feet 6 inches long, and 4 feet 6 inches in diameter, weighing in the rough, from 48 to 55 tons each. They were furnished by the Granite Railway Company, from the quarry in Quincy. Seven of them were quarried from one rock, two of which have arrived in the city.

They were transported on the railway from the quarries, a distance of 1½ miles, to the Plymouth road, on carriages prepared for the purpose, and thence 10 miles to Boston on a kind of sledge, upon the snow.

Four carriages, with four wheels each, were prepared for the reception of the stones on the railway. The two front carriages, and the two hinder ones are severally connected by two timber frames, bearing upon the centre of the solid carriage frame, and these two frames are connected by another frame of timbers, on which the stone is laid. In fig. 1 of the plate, is

shown a side elevation of the carriage and frame work, with the stone upon it. Fig. 2, is an end elevation of the same. The bearings of the two frames on the four carriages, and of the upper frame on the two lower ones, are rounded, and a strong bolt passed through the centre of the bearings, but through holes so cut that the bolt has room to play a little back and forth. The reason of this construction is this:— 400 feet in length of the railway is an inclined plane, making a descent of 90 feet perpendicular height. When the foremost carriage comes upon the inclined plane, it of course tips forward; and if the frame resting upon it had no room to yield, it would be strained and bent, being also fastened to the carriage immediately behind it. But the end of the frame bearing upon the carriage being movable on its bearing, is not bent at once out of its horizontal position, but yields gradually till the other carriage follows down the slope.

On a portion of about one fourth of the railway, which had an inclination of 225 feet per mile, it was anticipated that an undue velocity might be gained in the descent, to obviate which difficulty a compound lever brake was attached to the carriage, to check the wheels during the descent. Fig. 5, is a representation of one of the carriages showing the brakes, on the wheels. An end elevation is seen in fig. 6. The brake is managed by four men in each carriage. By turning the windlass seen at the end of the carriage, the rope about its axle is wound up, and this raises the lever to which it is attached, which, turning on a fixed point on the sides of the carriage, bears the brakes, seen above the wheels, down upon them, and checks their velocity.

In order to facilitate the operation of getting the stones upon the carriage, in the first place, two walls were built from the spot where they lay, to a temporary wooden railway, laid from the main railway. The walls were of an equal height with the top of the carriage frame which was to receive the stone, which lay in a position sufficiently elevated above the railway, to be drawn over the walls to the top of the carriage prepared to transport it.

The carriage being drawn up against the perpendicular termination of the walls, the stone was rolled on rollers, over the walls directly upon the carriage.

After leaving the railroad, the pillars were transported on the snow, on sledges. A side elevation of the sled, with the stone upon it, is shown at fig. 3, and at fig. 4, a top view of the same. Two sleds of solid plank-work, were connected by two chains; each sled being 14 feet long and 9

wide, the whole area of which had a bearing upon the snow. These sleds were so contrived that the load could be turned at any angle desired. At the bottom of each sled was an iron keel, extending its whole length, and 3 inches square, designed to keep the sled from sliding to one side and the other, on its progress. The stones were drawn by sixty-five yoke of oxen and twelve horses; and the time occupied in bringing them on the Plymouth road to their destination, was in one instance eight, and in another eleven hours.

The carriage and sled were designed by GRIDLEY BRYANT, Esq., Engineer of the railroad, to whom we are indebted for the preceding information. They were made under his superintendence, and fully answered the purpose for which they were intended.

EDUCATION AMONG MECHANICS.

[By one of the Editors.]

WE shall continually and earnestly look to the education of our mechanics, as the only successful means of their improvement. We hope that the strong efforts which are now making in the cause of education will not stop at partial results, nor be relaxed, till the whole mass of the community shall be thoroughly imbued with the leaven of sound and practical knowledge. It is now very generally understood and felt, that learning is not alone useful to the rich and independent, but to those who 'eat their bread in the sweat of their brow,' to the cultivator of the earth, and the mechanic who toils daily with his hands.

When we speak of an educated community, we do not premise, that all will become great or learned men; we do not anticipate a community of literati or scientific experimentalists. There is a common-sense learning, a practical education, which every one can and ought to acquire, which will teach him his duty to himself and his fellow beings, and the best manner of performing that duty. There is an education which fits every one to the sphere of life in which he may be called to move; and this must be attained. It is rather a learning of observation, and the science of common things, than abstruse and deep processes of intellect, which are required of the every-day man. It is rather general than particular knowledge.

When we speak of learning and science, and the advantages of education, some think we talk of Greek, and Latin, and Conic Sections; and they feel no interest in our remarks, and do not consider that our arguments come home to their case. But while we leave those to the divine, and the scholar, we call upon our fellow-citizens who, though in less eminent, are still in as useful stations, to become learned in things which concern themselves, their business, and therefore, the general good of mankind.

There are those who are not prepared to comprehend the value of knowledge. That which the experience of those who have tried it has declared to be 'power,' they regard as of little importance to them. These of course care little for books, periodicals, or other now numerous means of intellectual improvement. We can aptly compare them to those who, deprived of the faculty of vision, are contented with the scanty information which the sense of feeling imparts, of objects within their reach, not imagining how much greater sources of knowledge and useful effort would be afforded them by the use of eyes.

But we would appeal to the mechanic himself on this point, to those, who are endeavoring to raise themselves to a station in society of which they feel themselves deserving, and who have come to the inevitable conviction that without EDUCATION, all efforts of this kind must be finally unavailing. We ask them if they have not seen, that for the very want of this education, rash, injudicious and ineffectual measures have been adopted by some among the producing classes, to remove a fancied or real degradation under which they lie.

But that very inequality which they feel to be so oppressive, it is to be apprehended, is in a great measure owing to their inferior amount of intellectual strength. So long as in a free country the intellectual wealth of any class is inferior, so long will the superior intellect of the more educated portion be in danger of overbalancing them. If they endeavor, by combination of forces, to secure the rights and privileges which they claim as their due, a stronger counter-combination might be brought to bear like an overwhelming sea upon them. And though the merchant, and the professional man, and the independent landholder, may not organize under the banner of a constitution, to bear down the struggles of the operative in asserting his claims, the *effect* of a combination may as truly take place as though its spirit were present, from that self-interest in which men must be expected to act,

in bringing their resources to bear upon their own private emolument, without regarding the general good.

But should we accuse the mercantile man of appropriating his resources too exclusively to the increase of his capital, and the professional man of sometimes using his intellect to promote his own ends, to the neglect of the general good, —if we have reason to believe, as we are told we have, that the operations of these classes have, in a measure, a tendency to injure a portion of the community, by causing the distribution of wealth to be disproportionate to the labor bestowed for it, by those of different occupations,—we also blame the mechanic, for having been content to stand so low, and to exert so little influence. He is to be blamed for having forgotten that elevation of condition is only to be made permanent by a corresponding elevation of moral sentiment and intellectual power.

It will be alone when he has learned to *think* and to reason, that he will be able to take a successful stand to maintain his integral rights. Then in the Hall of Legislation, will he come forth, and bring his sound and practical intellect into contact with the more refined, and it may be, too theoretical minds of many professional legislators.

We feel that a change has even now begun to come over the face of a wide-spread community. If an era of rapid advancement in science is already darting its noonday beams upon the nineteenth century, an era, we trust, is dawning, of the universal diffusion of general knowledge among the people, which may spread a life-giving light even over the world, and arouse the nations to see and to seek their own best good in the fulfilment of the laws of their Creator.

To realize the near and successful accomplishment of such a revolution as this in the community, and to secure all the advantages of the general diffusion of useful knowledge, it behoves not only those already high in intellectual advancement to use their efforts in sustaining the influence of the higher seminaries and colleges, and causing them to advance with the spirit of the age, but it is incumbent on every class of society to seek their own moral and intellectual improvement, in the highest degree and manner comporting with their various stations and occupations. The spirit of the love of knowledge must be diffused, and felt, among those who are now insensible to it; and men must learn, not only that their hands, but their minds, are given them for all important purposes: and we trust that the portion of the community to

whom we particularly address ourselves, will not fail to see that on their effectual labors will depend no inconsiderable portion of the happy results of the general diffusion of knowledge.

WARMING ROOMS.

[Furnished for the Boston Mechanic.]

THE importance of heating and ventilation, in a country where tight rooms and hot fires are in requisition for six months of the year, is paramount. All communications upon so interesting a subject will be gladly received. The following is from an old and valued correspondent.

MESSRS. EDITORS:—I was glad to learn that efforts were making to sustain the Mechanic, and I hope our mechanics generally will be willing to aid in its support, and will avail themselves of the opportunity offered of contributing to its pages, whatever ideas they may possess which are calculated to interest its readers.

With this view I send you a description, with drawings, of a method which I suppose might be useful in very cold weather, to contribute to the comfort of those who cannot afford to keep fires in their sleeping rooms. Among many expedients which have been adopted for this purpose, some are unhealthy, and others absolutely dangerous; we might for instance, mention the use of warming pans, hot bricks, bottles of hot water, and burning charcoal, the last of which, in close rooms, is known to have been often a cause of death.

During the late severe weather, my mind was turned to this subject; and I endeavored to fix upon some method which would be free from the disadvantages of those above alluded to, and at the same time equally efficacious.

It occurred to me that most small families have the convenience of heating water by their common culinary fire; and that considerable heat was required to raise three or four gallons of water to the boiling point, and that if this water, so heated, could be placed in a small bed-room, so that its heat might be quickly distributed, (the fire-place, doors and windows being closed,) the room would be warmed at least so as to be comfortable; the water being made ready just before bed-time.

The next step then was, to provide that the heat of the water should be quickly abstracted, by exposing a large sur-

face of it to the air, or the conducting material of the containing vessel. Several forms of apparatus suggested themselves, two of which are represented in the engraving, which it is proposed to construct of tin or copper.

Fig. 1. Fig. 2.

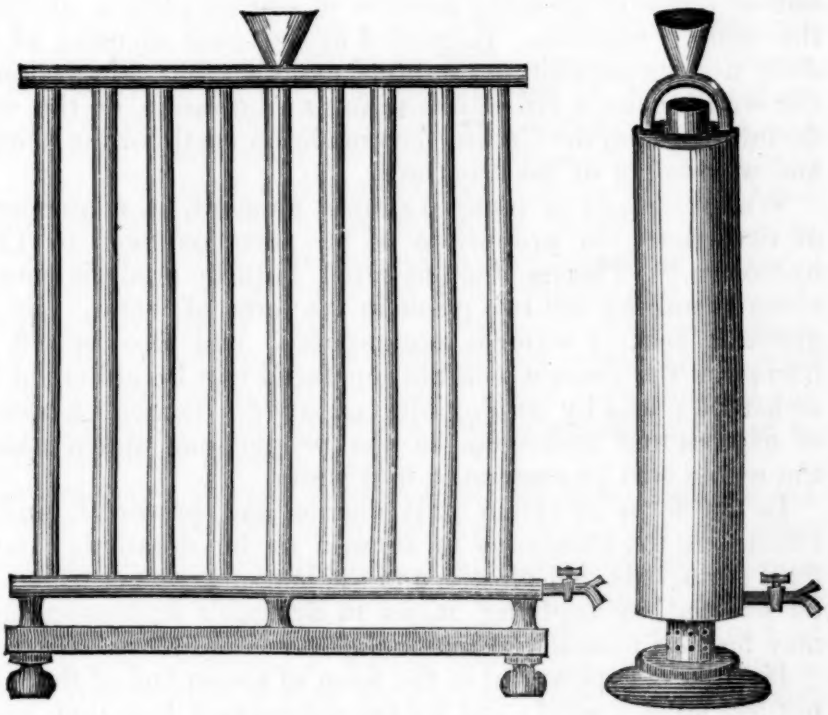


Fig. 1, is a vessel consisting of several flat or oval shaped tubes, which are closed, except at the top, where is a tunnel to pour in the water; and at the bottom is a cock to discharge it. It will be observed, that the tubes are connected at top and bottom, so that from one tunnel all the tubes are filled.

Fig. 2, consists of two flattened, or elliptic tubes, one within the other, between which the water is to be poured; and the water will be thus exposed within and without, to the air. A current of warm air will pass up the inner tube, which is perforated with small holes at the bottom, and open at top. A tunnel and stop-cock are provided, for the entrance and discharge of the water.

The effect of both instruments will be at once perceived, and it will be observed that the danger from fire, as well as from impure or contaminated air from the heating apparatus, is entirely obviated. PHILO.

WATER.

[Furnished for the Boston Mechanic.]

Water, in its several states of liquid, solid and vapor, is one of the most pleasing sources of contemplation of which the mind is capable. Regarded as the pure element of our daily use, its nourishing qualities and peculiar adaptation to our wants cannot fail to excite in us admiration at the wonderful provision the Creator has made on earth for the comfort and well-being of his creatures.

Water, instead of being a simple element, is a compound of two gases, in proportion of 88 parts oxygen* to 12 of hydrogen.* This is demonstrated both by analysis and by actually uniting the two gases in the form of water. By the galvanic battery water is decomposed, and also by red hot iron; and the gases which are separated can be collected and measured; and by passing electric sparks through a mixture of oxygen and hydrogen, in the proportions above named, the whole will be converted into water.

In the form of steam it is elastic and powerful, and its effects are too numerous to require to be detailed. In the fluid state, it is non-elastic, and the immense power which can be exerted by applying it, as in Bramah's hydraulic press, may be well considered incalculable.†

If water is so powerful in the form of steam and of fluid, it is not less so as a solid; and we are not certain but that water, during congelation, exerts a force superior to that produced by it in any other form. According to the calculations of the Florentine Academicians, published in 1684, a spherule or small globe of water, only one inch in diameter, expands in freezing with a force superior to the resistance of 30,000 pounds! An attempt was made several years since, in England, to discover if this expansion could not be successfully resisted. An iron bomb-shell about an inch and a quarter in thickness, was procured and filled with water at the tempera-

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* Two words from the Greek, signifying acid-maker, (because oxygen enters into the composition of acids,) and water-maker, from the agency of the latter in producing water.

† This power has been successfully applied in New York, to raise vessels into a dry dock to be repaired. The Peacock, U. S. Sloop of War, has been recently raised into this dock.

ture of 42°; an iron plug was then screwed firmly into the orifice to prevent any escape, and the prepared shell exposed to the air at 30°, or 2° below the freezing point. The water was soon frozen, during which it expanded with such force as to project the plug, (weighing several pounds) to the distance of two hundred feet, with great velocity. The plug was then more firmly secured, and the experiment repeated, when the shell itself burst, being unable to resist this extreme pressure. Nature furnishes us with many instances of this resistless energy and overwhelming power. The torrents of lava and ashes which issued from the crater of Vesuvius, and buried the cities of Pompeii and Herculaneum, were the awful and desolating effect of fire: but the more frequent avalanche which tumbles from the snow-capped mountains of Switzerland, converting in its course the fertile valleys and beautiful villages of the hardy Switzer to a vast wilderness of ruin, is but a similar instance of the extraordinary power of congealing water; and man may as well attempt to subjugate the fires of Etna as to counteract the laws of nature in regard to the expansion of freezing water.

Having given several instances, let us now consider the *cause* of the expansion of water, while assuming the solid state. M. de Marion considers 'the increase of bulk to proceed from a different arrangement of its particles, ice being a crystalization* composed of filaments uniformly joined at angles of 60 degrees, in which disposition they occupy a greater volume than if they were parallel, as it is supposed they are in the fluid state.' This appears too good an hypothesis to be passed without comment; if this is the case, does it not account for the numerous bubbles which are always seen in bodies of ice, and are more visible in that which has been rapidly formed? By the rapid transposition of particles by which they are made to occupy more space, little spherical vacuums are formed, but they are quickly supplied with vapor formed by the sudden transition of a fluid to a solid state. Thus the bubbles do not depend upon exposure to the air, but the material for their formation is included in the fluid itself.

The increase of bulk and buoyancy of the bubbles causes ice to be specifically lighter than water; there are however some peculiarities of water to be described to enable us to understand the cause more readily. It is an exception to the

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* The word ice originally signified crystal.

truth that all bodies, fluid or solid, become more and more dense as the heat is reduced. Water alone has also a *point* of density, a temperature at which it is in its heaviest state, and if it is heated above or cooled below this point, indicated on Fahrenheit's thermometer at 42°, or 10° above freezing, it becomes larger in bulk and consequently lighter. This is found to be precisely the same for any number of degrees above or below 42°; that is, the weight and measure of a pint of water at 33° and 51° are the same—and if a tumbler were filled with water at 42°, it would, whether heated or cooled, flow over the sides of the vessel. The object of this law is clear and apparent. Suppose the heaviest state of water to have been 32° instead of 42°:—When the atmosphere was at this temperature in winter, the surface of our lakes would be frozen, and would sink immediately to the bottom; another layer would be similarly congealed and sink also, and the consequence would be, that no subsequent summer would be sufficient to unbind the vast repository of ice thus formed. Under these circumstances, the now *temperate* portions of the globe, would soon resemble the frozen chaos of the Arctic regions. The process of freezing is this:—The surface of exposed water is cooled to 42°, when it sinks, on account of its increased density; other water then rises and is exposed to the surface, becomes cooled, and likewise sinks, until the whole mass is reduced to 42°. At this time, if the atmosphere is freezing cold, the upper layer of water does not sink when the temperature is 42°, but continues to expand and become the lightest portion of the mass, until it floats upon the surface, a body of ice. If the water be too deep to suffer the whole mass to be brought to this temperature, no ice can possibly be formed at the surface.

The following account will illustrate the tenacity of water in its solid state. At the marriage of Prince Gallitze in 1740, the Russians applied ice to the same purposes as wood and stone; a palace fifty-two feet long, sixteen feet wide, and twenty feet high, was built in St. Petersburg, according to the most elegant rules of art. The river Neva afforded the ice, blocks of which from two to three feet thick were cut and embellished with various ornaments. When built, the different parts were colored by sprinkling them with water of various tints. Even the furniture of the rooms was made of ice; and six cannon made of and mounted with ice, with wheels of the same matter, were placed before the palace to fire the salutes in honor of the day. They performed more than once without bursting, and a hempen bullet was driven

by one of them in the presence of the whole court, through a board two inches thick, at the distance of sixty paces.* Cowper thus beautifully describes this ice architecture:

'No forest fell,
Imperial mistress of the fur-clad Russ,
When thou wouldst build; no quarry sent its stores
To enrich thy walls: but thou didst hew the floods,
And make thy marble of the glassy wave.
Silently as a dream the fabric rose;
Ice upon ice, the well adjusted parts
Were soon conjoined—nor other cement asked
Than water interposed, to make them one.
Lamps gracefully disposed, and of all hues,
Illumined every side. Long wavy wreaths
Of flowers, that feared no enemy but warmth,
Blushed on the pannels, which were once a stream,
And soon to slide into a stream again.'

Boston, Feb. 6, 1835. J. M. W.

AMERICAN PATENTS.

[Abridged from the Journal of the Franklin Institute.]

[HEREAFTER we shall vary our method of giving accounts of patent inventions. We shall confine ourselves more particularly to New England, but shall endeavor to describe the truly useful, from whatever section of the country. We shall give many of the descriptions in a more concise form than we have hitherto done, believing that such will be equally valuable, and at the same time, give more space for other useful matter.]

PATENT *for an improvement in the Air-Pump;* Timothy Claxton, Boston, Massachusetts, June 7.

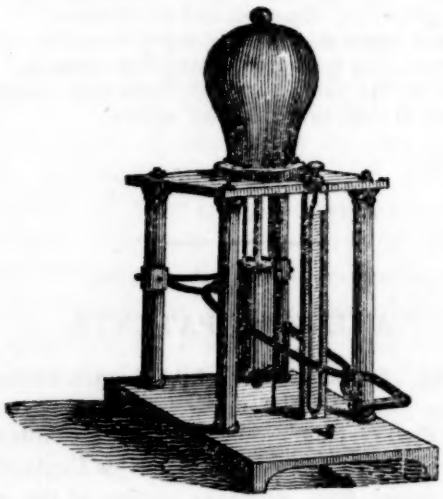
The improved air-pump for which the patent before us is obtained, is single barrelled. The pump-plate is elevated above the table, upon four pillars, as is frequently done with double barrelled pumps; the barrel is placed directly under the centre of the plate, and is, in general, made to work up and down upon the piston, the latter being stationary. The piston rod descends from the centre of the pump plate, and is perforated through its length; the barrel is fitted between two vertical guides, and a lever, working up and down like a pump handle, has its fulcra sustained by two of the pillars; this lever has an opening to allow it to pass on each side of the barrel, to which it is connected by joints; it is made of cast

* Bishop Watson and M. de Bromare.

iron, is japanned, and very neat in its appearance. The barrel is closed at bottom, and open at top; as it descends, the air from the receiver passes into it, and as it ascends, it is forced out through a second vertical opening in the piston, each of the openings being furnished with a valve.

The kind of guage claimed is not new, and the method of fastening the pump to the table might, we think, as well have been passed without a claim. The whole apparatus, however, accomplishes the intended purpose—namely, it acts well, and is offered at a very moderate price.

We have obtained for the Mechanic the cut below to illustrate the neat air-pump which is the subject of this patent.



PATENT *for a Water Wheel;* Henry Averill, Richland, Oswego County, New York, June 18.

This patent is for a wheel with hinged buckets or floats which fall against the wheel in ascending, so as not to lift back water, while they are prevented from so doing in the descent. The patentee says he has tested its usefulness by experience. If many other inventions had been so tested beforehand, they might never have seen their way to the patent office.

PATENT *for an improvement in the Steam-Engine;* Sprague Barber, Providence, Rhode Island, June 14.

We quote in the words of the patentee, the statement of the advantages of this invention.

'The advantages resulting from this improvement are, First, the position of the cut off valves so near the leading valves, admits the steam at each operation, the steam to pass into the cylinder at the same pressure that it

is in the boiler, and immediately, upon the opening of the leading valves. Second, as the cut off valves open before the engine comes upon its centres, the steam accumulates upon the leading valves before they are opened, so that as soon as they are opened, the steam passes into the cylinder with a pressure equal to the pressure of the steam in the boiler, and this upon its first admission into the cylinder. A regulator on an engine would not effect the improvement, as that operates only on the last part of the steam passing into the cylinder. Third, an engine with this improvement will perform the same work with a far less quantity of fuel than an ordinary engine.'

The invention claimed is a compound eccentric, formed by adding another eccentric to the main eccentric now in use, whose operation is to regulate the valves as above described.

PATENT *for improvements in the Power Loom;* Adan Holbrook and Benjamin B. French; Dunstable, Hillsborough County, New Hampshire, June 17.

This consists of contrivances whereby the loom is stopped, or the weaver notified, when an accident happens to the work, called stop motions, and a let off motion, to proportion the quantity of warp unrolled from the beam.

The ends to be accomplished, at least, are important. The machinery is not described.

PATENT *for Promoting the Combustion of Anthracite in Locomotive and other Steam-Engines;* Phineas Davis, Civil Engineer, Baltimore, July 29.

This consists in employing fans to force a strong draught of air upon the fuel, which are set in motion by the steam, after it has performed its work in the cylinders.

The fans revolve in hollow drums, whence the air is blown upon the fire through pipes, with great velocity. On the axis of the fans is a steam-wheel, which the steam from the cylinder impels round, by acting against wings or vanes.

PATENT *for Metal Combs;* Allen Porter, Hartford, Hartford County, Connecticut, June 14.

The improvement consists in fastening the teeth without soldering or rivetting, and without having the teeth come through the back of the comb.

ADVANCEMENT IN THE USEFUL ARTS.

[Furnished for the Boston Mechanic.]

We are fully satisfied, that if Franklin's half formed wish, to be revived like some flies preserved in spirits, a hundred years after his death, to see the improvements in the country, could now be gratified, he would consider the progress already made, to be far beyond his expectations. The steamer which bears his name, would hardly carry him from place to place with sufficient rapidity to gratify his eager curiosity. We do not propose to enter, at this time, into the full consideration of this subject, but merely to introduce the short but comprehensive notice of the Governor of Massachusetts in relation to it, contained in his annual speech, at the commencement of the session of the General Assembly the present year. The correctness of the sentiments will be recognized by every man who will open his eyes, to see what has been, and is now being done.

'Within the last half century, the advancements in knowledge have increased the productions necessary and useful to mankind, beyond all former example. Machinery and tools, abridging human labor, have been introduced into most employments with such success, that the greatest art now consists in making the implements with which labor is performed. It required great intellectual penetration and comprehensiveness to invent, and the accomplishments of ingenious artisans to construct, the spinning frame, the power loom, the printing press, the machine for making paper, or for making cards; and yet any of these, as well as thousands of others, equally important, are managed and worked easily by females and children. These substitutes for human toil are adapted to our necessities, and minister largely to our happiness, by enabling us with greater success to withstand the overwhelming competition of foreigners.

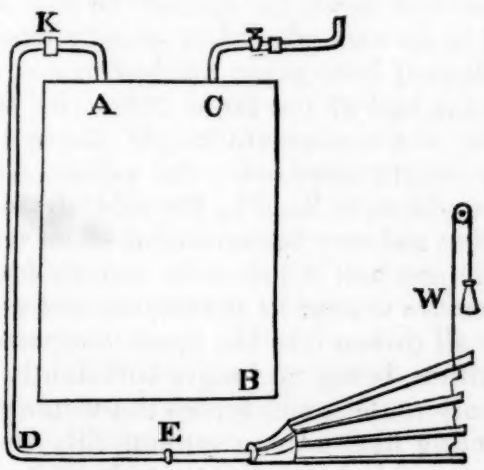
'Discovery has hitherto produced no agent, unless the Mariner's Compass, that promises to work greater changes in the condition of mankind, than steam, in its application to transportation. It has converted the great rivers of this broad country into highways, that bear upon their surface an immense trade, and thus, as well as by *peering* mountains, it brings regions which must otherwise have remained strangers into almost daily intercourse, creating innumerable ties of mutual dependence, strengthening attachments by constant social intercourse, bearing onward a commerce that reaches from extreme to extreme, covering the whole country, and

adding to our political union, the ligaments that alone can sustain it a union of interest. This application of so powerful an agent seems to have been reserved for this age, to demonstrate that if we do not live in harmony, and perpetuate our republic, it will be because of our folly or our wickedness.

'It must be gratifying to the people of the Commonwealth, to see the proofs of enlightened private enterprise, in opening ways for it to traverse the interior regions of the state. Long lines of easy, expeditious and cheap communication are constructing, which will give new facilities to business, new inducements to invest capital, and new employments to labor. The resources of agriculture will be enlarged, the markets, business and population of the metropolis increased, and we shall, I trust, be able to maintain a successful competition in prosperity with those states which have added to their greater natural advantages, like improvements.'

NEW HYDRAULIC BLOW-PIPE.

[From the London Mec. Magazine.]



In this figure, AB represents a rectangular tin box, usually half filled with water, and divided into two compartments by a diagonal partition, reaching from the top to within a quarter of an inch of the bottom, as in the common hydraulic blow-pipe. At A is inserted the tube, which reaches nearly to the

bottom of the box, and which may terminate at K, when nothing more than a mouth blow-pipe is wanted of small power; but for the purpose of maintaining a powerful blast for a considerable time, a piece of pewter gas-pipe is fastened with white lead cement at K, and continued in the line KDE, so as to be cemented at E to the nozzle of a common kitchen bellows, of which the lower board is fastened to the floor. To the upper board is fastened a string, which is carried round a small pulley, and terminates in the weight W, which raises it. The bellows is worked merely by pressing on the upper board with the foot; and the air which it forces into the box is carried out to the lamp by the jet pipe, which is inserted at C. This pipe is furnished with a stop cock, which is very convenient for regulating the blast, and is absolutely necessary when gases are used. In my apparatus, which I have used for many months, the tin box is 8 inches square in the base, and 16 inches in height, and consequently the maximum pressure is about $\frac{1}{30}$th of an atmosphere, supposing it to be little more than half filled with water; but had I to make another apparatus of the kind, I should make the base 16 inches by 8, instead of a square, retaining the same height, so that the pressure, without being increased, might remain uniform for a much longer time, and the work of the bellows be diminished. It is scarcely necessary to remark, that the height of the box must be limited by the strength of the bellows, and in no case should it greatly exceed 16 inches. For convenience, I have made the box to rest on a shelf, projecting from the end of the table below its surface, so that the jet may be at a convenient height above it, the pipe KDE being of any length required: the pulley, which bears the string and weight W, is fixed to the side of the table.

A remarkable and very inconvenient effect takes place if the vessel be only just half filled with water; for, in this case, when the pressure is near its maximum, and consequently the water nearly all driven into the open compartment, the condensed air within, being no longer sufficiently resisted by the water, suddenly recoils, and forces the water up to K, and the tube AKD acting like a long syphon, fills the bellows with water, and probably bursts it; but, however paradoxical it may at first sight appear, this misfortune will never happen so long as there is a sufficient supply of water in the box.

WILLIAM COOK.

STEAM-CARRIAGES ON COMMON ROADS.

We extract the following, under the impression that the subject is interesting to many of our readers. It is a letter from a correspondent of the Railroad Journal residing in England. The results of the present active experimentation in England on the subject of steam-carriages and railroads, should be looked upon as having an important bearing upon the interests of commerce, manufactures and civilization.

Sir :—Having occasion, a few days since, to accompany two Philadelphia gentlemen to call on Mr. Hancock, who has steam-carriages travelling on the common roads of this metropolis, I beg to give you some memoranda of the information I obtained from the conversation with that gentleman, which may probably interest the numerous readers of the excellent and most useful 'American Railroad Journal,' which I receive regularly from my brother in Philadelphia, and always peruse with the greatest pleasure.

Enclosed, I send you the principal information derived from Mr. Hancock.

Before I left home (Philadelphia) last spring, I had frequently endeavored to gain information respecting the expediency (the practicability has been established beyond doubt by the engines of Gurney, Ogle, Hancock, Maceroni, &c.,) of steam-carriages on turnpike roads, and pavements, but could not obtain any facts to satisfy me that they could be used in competition with coaches drawn by horses. Since my arrival in London, the information given induces me to believe they *may*, under favorable circumstances, in England, compete with animal power, but I strongly doubt whether they will answer equally well in our country; and I think it highly probable that, in the course of a short time, they will be much more generally used in England for stage coaches, and for the transportation of the mail. This opinion is founded on the following circumstances :—1st, horses are costly in England, and are maintained at great expense; 2d, the roads are good, and kept in perfect order; 3d, steam power is cheap, owing to the low price of all machines made of metals, as well as the low price of fuel. In our country, on the contrary, horses are cheap, and are supported at one half the cost that is customary in England; 2d, our roads are unfortunately constructed on wrong principles, and are consequently excessively bad, and will remain so until they are

made on a better plan;* 3d, fuel and labor are expensive in our country. From the above mentioned circumstances, I think there is some probability of their becoming useful machines in England, but I cannot suppose they will be profitably employed in the United States. There are, however, some roads and streets on which they *might* be used—for example, between Boston and Salem; between Providence and Pawtucket; from the Battery to the highest part of Broadway in New York; and from the Exchange to the Schuylkill river, in Philadelphia, and there may be some other locations, which, however, it is unnecessary to mention, where the roads may be sufficiently good to enable the locomotives to travel on them; but it is out of the question to expect them to travel over turnpikes equally bad as those of my native state, which, although not so bad as in some of the other states, are so rough as to be discreditable to our citizens.

GREAT BLAST AT CRAIGLEITH QUARRY.

The long time in which preparations for a great explosion at this quarry have been going on, and the effects that were expected to result from the experiment, by a great saving of labor and expense, in at once dislodging a great mass of rock, and also lessening, if not altogether removing, the risk which attends the blowing up of small portions of rock from the flying fragments, rendered the experiment which took place on Saturday, (18th Oct. 1834,) a subject of much interest both in a public and scientific point of view. It having been intimated by bills that the blast was to take place

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* To prevent misconception, it may be proper to mention in what respects our turnpikes are defective. 1st, they are too *convex;* they rise too much from the sides to the centre, and the consequence is that all the travel is forced on to the crown of the road, which is soon worked into *four ruts*, two of which are formed by the two horses' feet, the other two by the wheels of the carriages. The second defect is, the *metal* is not homogeneous, (hard and soft stone ought never to be used together,) and not broken sufficiently small. The third defect is the absence of sufficient under-draining. I hope most sincerely my countrymen will 'mend their ways'—they are now abominable; and it would not be more expensive to make roads equally good as those in Great Britain and Sweden than to make them in their present bad condition.

at three o'clock, long before that hour, crowds of people were proceeding along the roads leading to the quarry, and by three o'clock, every place which commanded a view of the spot was filled with spectators. At the time when the explosion took place, there was no fewer than ten thousand people on the grounds around the quarry; and curiosity was so much excited, that even on the Castle-hill, and also on the Corstorphine-hill, a great many people were collected. At half-past two o'clock, the conductor, enclosed in a block-tin-tube, 26 feet long, and half-inch diameter, was introduced into the bore. The depth of the bore was 60 feet, and 7½ inches diameter at top, and 6 at the bottom, and was charged with 500 lbs. of Sir Henry Bridge's double-strong blasting powder. At half-past three the match was lighted, and in three minutes the explosion took place. The report was not so loud as from a small piece of ordnance; but the effect that was produced, was highly satisfactory to all the scientific gentlemen present, and completely fulfilled the expectations that had been conceived by the projector. At the moment of explosion, the great mass of rock appeared to those at a short distance to be forced upwards, and then to rend in large and deep fissures. It is calculated that upwards of 20,000 tons of solid rock have been displaced by this experiment. The plan seems to be perfectly safe and practicable, and, we understand, was conducted and carried through by Mr. Millar, who, in 1824, after the great fire in the Parliament Close, suggested and carried into effect the blowing up of the gable of the high land which overlooked the cow-gate. Among the scientific gentlemen who were present, we observed Mr. Jardine, Mr. Playfair, Professor Wallace, Professor Forbes, Mr. Stevenson, Mr. Buchanan and Mr. Grainger.—ENGLISH PAPER.

ANIMAL WEATHER GLASS.—In Germany there will be found, in many country houses, an amusing application of zoological knowledge for the purpose of prognosticating the weather. Two frogs are kept in a glass jar about eighteen inches in height, and six in diameter, with the depth of three or four inches of water at the bottom, and a small ladder reaching to the top of the jar. On the approach of the dry weather the frogs mount the ladder; but when wet weather is expected, they descend into the water. These animals are of a bright green.

MECHANIC CORRESPONDENCE.

CHLORATE MATCHES.

MESSRS. EDITORS:—Your correspondent, A. A. V., in your October Mechanic, will find, if he will look at the article again, that the mistake rests with himself, in using *sulphate* instead of *sulphuret* of antimony.

Perhaps he would like to make the other kind of chlorate matches. They are made by taking one part red lead, five parts loaf sugar, and ten parts chlorate of potash, ground and mixed together with alcohol so as to form a paste; and dipping the ends of brimstone matches therein, and (when dry) touching them to sulphuric acid, they will be inflamed.

Yours, &c., C. D.

QUESTION.—Having a piece of land in the form of a right-angled triangle, the perimeter, or sum of all the sides of which is $= a$ rods and the length of a line drawn from the right angle to the hypothenuse $= d$ rods;—from these data required the sides of the piece of ground.

N. B.—It is presumed that the author of the answer to the question in the October number of the Mechanic, misunderstood what was required in the question; he is therefore requested to examine it again. It is the distance *ac* which was required.

ARITHMETICAL QUESTIONS.—A correspondent has furnished us with three questions, one of which is of the following tenor:

'Suppose a stick of timber 1-3 in the mud, 1-2 in the water, and 3 feet out of water:—of what length is it?'

The other two we are unable to read, and must request the writer to copy them again for us, if he wishes them to be inserted.

TO CORRESPONDENTS.—Mechanics, and all interested in the welfare of the arts and sciences, are requested to favor us with communications on the various subjects with which they are particularly conversant. Facts, practical observations, and descriptions, will never come amiss. Where the subject is practical and important, the wording is of less consequence; and those who will oblige us in this way, need not fear that a standard of literary merit will oppose the introduction of truly useful matter, however plain the language.

NOTES FOR MARCH.

New Paddle Wheel.—The Nautical Magazine contains a notice of the invention of a new paddle wheel for steam-boats, by Mr. Symington, the same person who claims for his father the first application of steam to the purposes of navigation. The purpose of the invention is to perform the work of the ordinary paddle wheel, without producing back water. It is said this has been done by what is there called Morgan's wheel, but with the addition of much machinery. An angular movement is given to the paddles of Mr. Symington's wheel while in revolution. The paddles, which are divided, enter and leave the water in a direction nearly parallel to the side of the vessel, and have their best effect when acting in a vertical direction. Such at least were the expectations of the inventor. Since the first notice of the invention, an experiment has been tried on a government steam-vessel—the Alban. On the 19th of November, the Alban proceeded down the river from Woolish, and returned in a few hours. During the trial, the superiority of the new paddle-wheel is said to have been remarkably conspicuous by the minuteness of the wave produced in the track of the vessel, compared with that from the common paddle on the opposite side.

It is however added, that the trial was made under several unfavorable circumstances, which require to be removed before the great superiority of the invention can be completely established.

Ice-Boats.—To the southward of us, where the frost has congealed the waters of the bays and harbors, as well as in our more arctic latitude, a boat called an ice boat has been used, for opening a passage through the ice. It is a strongly built steam-boat, with a prow like 'the bowl of a spoon,' which, say the papers, broke a passage through ice of a foot in thickness. Its operation is by driving over and pushing the ice down under it, and thus breaking it; acting by its weight as well as its momentum.

Important to Coopers.—The Genesee Farmer says—Messrs. Levi and Luther Benton, both citizens of this county, have lately invented a stave machine, which is now in successful operation in the village of Scottsville. The utility of this invention consists in the despatch with which it operates, the facilities it affords of manufacturing staves from timber before unavailable for that purpose, and the perfect finish it gives to a barrel constructed from staves prepared by it. It is satisfactorily ascertained, that with the labor of three men, it will saw, dress and joint

one thousand staves in an hour, and this can be done from any description of timber, without reference to the kind, or the irregularity of the grain; and when finished, they are superior to those wrought by hand, both in the regularity of their form and appearance of their surface.

Lyceums and Lectures.—Lectures on almost every useful subject of inquiry have been delivered and fully attended the past winter, in this city. Numerous lyceums and societies are in active operation, before whom lectures are delivered; among which, as peculiarly deserving our notice, we mention the Mechanics' Lyceum, Franklin Lectures and Mechanic Apprentices' Library Association. We hope the mechanics, both here and in more remote places, will not forget to form lyceums where there are none, and cheerfully engage in their support where they are established; being assured that no labor is lost, but rather that much is gained by everything calculated to improve the intellectual and social feelings.

Important Invention—Artificial Stone.—Mr. Parker, of Syracuse, N. Y., has discovered a composition which will harden like stone, and yet may be worked in a soft state like mortar. Exposure to the weather causes it to petrify and become so hard, that it requires a heavy blow with a hammer to break it. It may be cast in moulds in various forms, and is not dearer than brick. The American Institute have awarded Mr. Parker a gold medal.—Troy Institute.

New Application of Gum Elastic.—Mr. Geo. F. Cooper, of New York, has obtained a patent for an entirely new and valuable application of gum elastic, to prevent leaking in ships, damage to cargoes, and preserving the timbers from dry rot; also for sheathing roofs of buildings. Cloth saturated with the gum-elastic is to be applied, throughout the outer frame of a ship; so as entirely to exclude the sea water. In like manner is it to be used as a protection for timber work, roofs, &c.—N. Y. Star.

A New Moving Power.—A French practical chemist has discovered a ready mode of obtaining *liquid carbonic acid*, which he apprehends will be highly useful as a moving power, its expansive force being exceedingly great, exceeding that of steam.

Use of Hops for Tanning.—A patent has been taken out in London for the employment of the hop plant in tanning. We are not informed of the comparative merits of this novel application.